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Title: Dual View Endoscope

IN THE SPECIFICATION:

Please amend the specification as follows:

Please amend paragraph [0011] as follows:

-- [0011] The present invention enables rear view even in organs with a narrow lumen without the need to retro flex the endoscope. This is achieved by strategically adding a suitably designed 'rear view module' to a conventional endoscope. The rear view module consists of a rear image lens and a rear illumination bulb. The rear view module is a solid or tubular structure that can be of different shapes, sizes and configurations as illustrated in the preferred embodiments of the present invention. It is attached to the endoscope in different ways as illustrated in the preferred embodiments of the present invention. Once deployed, the rear view module positions the rear image lens and the rear illumination bulb facing backward. In this position, the rear illumination bulb illuminates the rear area and the rear image lens gives a rear view. The rear image lens is connected to an image processor and the rear illumination bulb is connected to a ~~light source~~ power source by electrical cables. The rear image lens and the rear illumination bulb can be used simultaneously or separately from the main image lens and the main illumination bulb, as chosen by the operator. Simultaneous forward and rear view can thus be obtained by using the forward image lens and the rear image lens together at a given time. This has the advantage of allowing a thorough examination of a hollow organ that includes both forward and rear views in a single passage.--

Please amend Paragraph [0047] as follows:

--[0047] The rear view module also contains a rear illumination bulb. The rear illumination bulb is connected to a light source by a fiber optic ~~an electric~~ cable. Light from the light source is transmitted via this cable to the rear illumination bulb. The rear illumination bulb uses this light to illuminate the area under view of the rear image lens. The rear image lens and the rear illumination bulb are typically activated upon deployment of the rear view module. The rear view module is deployed using an actuator. --

Please amend Paragraph [0056] as follows:

--[0056] FIG.5 shows side view of a first preferred embodiment of the present invention. The rear view module (51) is a long thin tubular structure encased in a sheath. It is placed along the periphery of a conventional endoscope. In the preferred embodiment, the rear view module (51) extends through the entire length of the endoscope but it may be shorter. The rear view module (51) has a distal end (50), stiff section, bending section and proximal section similar to an endoscope. In the preferred embodiment, the distal end (50), stiff section, bending section and proximal section of the rear view module (51) is in sync with the distal end (14), stiff section, bending section and proximal section of a conventional endoscope. The distal end (50) of the rear view module has a rear image lens (52) and a rear illumination bulb (53). The rear image lens (52) is connected to an image processor (not shown) and the rear illumination bulb (53) is connected to a ~~light source~~ power source (not shown) by electrical cables (54, 55) that run within the rear view module (51). Two pairs of cables within the rear view module attach the bending section of the rear view module to a rear view module actuator. Tension on these cables moves the bending section of the rear view module in vertical and horizontal planes. --

Please amend Paragraph [0061] as follows:

--[0061] FIG. 7 shows side view of a second preferred embodiment of the present invention. The rear view module (51) is a solid rectangular block with a proximal end (71) and a distal end (50). It is located within the stiff section of the endoscope. The rear image lens (52) and the rear illumination bulb (53) are located on the proximal end (71) of the rear view module. The rear image lens (52) is connected to an image processor and the rear illumination bulb (53) is connected to a ~~light source~~ power source by electric cables (54, 55). The distal end (50) of the rear view module is attached to the distal end (14) of the endoscope by a hinge joint or any other suitable mechanical articulation. The distal end (50) of the rear view module is connected to a rear view module actuator by a pair of cables (not shown). Tension on these cables moves the rear view module away from and towards the shaft of the endoscope as shown in FIG. 8.--

Please amend Paragraph [0065] as follows:

--[0065] FIG. 9 shows side view of a third preferred embodiment of the present invention. The rear view module (51) is a solid rectangular block with a proximal (71) and distal (50) end. It is located within the stiff section of the endoscope. The rear image lens (52) and the retro illumination bulb (53) are placed on the proximal end (71) of the rear view module. The rear image lens (52) is connected to an image processor and the rear illumination bulb (53) in connected to a ~~light source~~ power source by electric cables (54, 55). The rear view module rests on a support pillar/spring (91). The support pillar/spring can be extended and retracted perpendicular to the shaft of the endoscope. It is attached to a rear view module actuator by cables.--

Please amend Paragraph [0069] as follows:

--[0069] FIG. 11 shows a side view of a fourth preferred embodiment of the present invention. The rear view module (51) is made of two sub modules, the rear image module (111) and the rear illumination module (110). The sub modules are small rectangular solid structures. They are placed within the stiff section of the endoscope. The retro image module contains the rear image lens (52) and the rear illumination module contains the rear illumination bulb (53). The rear image lens (52) is placed on the proximal end (115) of the rear image module (110) and the rear illumination bulb (53) is placed on the proximal end (113) of the retro illumination module (111). The rear image lens (52) is connected to an image processor by an electric cable (54) and the rear illumination bulb (53) is connected to a ~~light source~~ power source by an electric cable (55).--

Please amend Paragraph [0075] as follows:

--[0075] FIG. 13 shows a side view of a fifth preferred embodiment of the present invention. The rear view module (51) is a solid rectangular block with a proximal (131) and distal ends (132). It is located within the stiff section of the endoscope. It contains a rear image lens (52) and a rear illumination bulb (53) placed on the proximal end (131) of the rear view module. The rear image lens (52) is connected to an image processor by an electric cable (54). The rear illumination bulb (53) is connected to the ~~light source~~ power source by an electric cable (55). The rear view module (51) rests on a support arm (130) within the stiff section of the endoscope. The support arm (130) also serves as an extension arm that can be extended, retracted and rotated. The distal end (132) of the rear view module is attached to the support arm (130) by a hinge joint or any other suitable mechanical articulation. It is also connected to a rear view module actuator by cables. Tension on these cables moves the rear view module (51) away from and towards the support arm (130). --

Please amend Paragraph [0080] as follows:

--[0080] FIG. 17 shows side view of a sixth preferred embodiment of the present invention. The rear view module (51) is a long and thin tubular structure encased in a sheath. It has a shaft that comprises of a distal end (170), stiff section, bending section and proximal section. The shaft is attached proximally to a handle (not shown). The handle has an extension that connects the rear view module (51) to an image processor and a ~~light source~~ power source. Rear image lens (52) and rear illumination bulb (53) are placed on the distal end (170) of the rear view module (51). The rear image lens (52) and the rear illumination bulb (53) are connected to an image processor and a light source respectively by electrical cables (54, 55). The bending section of the rear view module is connected to a rear view module actuator by cables. Tension on these cables moves the bending section in vertical and horizontal planes. This entire assembly is thin enough to pass through the main instrument channel (25) of the endoscope.--

Please amend Paragraph [0083] as follows:

--[0083] FIG. 20 shows side view of a seventh preferred embodiment of the present invention. The rear view module (51) is a hollow tubular structure with a proximal end (201) and a distal end (202). It is placed within the peripheral part of the stiff section of the endoscope, parallel to its long axis. The rear view module (51) is connected along its length to the stiff section of the endoscope by a hinge joint or any other suitable mechanical articulation. The rear image lens (52) and the rear illumination bulb (53) are placed on the proximal end (201) of the rear view module. The rear image lens (52) is connected to an image processor and the rear illumination bulb (53) is connected to a ~~light source~~ power source by electric cables (54, 55). Two pairs of cables one on the outside and the other on the inside, connect the rear view module to an actuator along its length. Tension on these cables opens and closes the module like the lid of a box (203) as shown in FIG. 21. When opened, the rear image lens (52) and the rear illumination bulb (53) face backward. The rear image lens (52) gives a rear view and the rear illumination bulb (53) illuminates the area under view of the rear image lens (52). The main

image lens (20) of the endoscope is able to give a forward view at the same time as the rear image lens (52) is giving a rear view. Hence, simultaneous forward and rear view is possible if the operator so desires. --

Please amend Paragraph [0086] as follows:

--[0086] FIG.22 shows side view of an eighth preferred embodiment of the present invention. The rear view module (51) consists of an inflatable balloon (220) or any other inflatable device that is attached to the stiff section of the endoscope. The balloon is connected to an air pump by a thin tube placed within the shaft of the endoscope (not shown). When inflated, the balloon (220) has a proximal face (221) and a distal face (222) as shown in FIG. 23. The proximal face (221) of the balloon contains the rear image lens (52) and the rear illumination bulb (53). Electric cables (54, 55) connect the rear image lens (52) to an image processor and the rear illumination bulb (53) to a ~~light source~~ power source.--

Please amend Paragraph [0091] as follows:

--[0091] FIG. 24A shows side view of a ninth preferred embodiment of the present invention. The rear view module (51) is a solid disc shaped structure that has a proximal face (901) and distal face (902). It is mounted on the distal end (14) of the endoscope. It comprises of a rear image lens (52) and a rear illumination bulb (53) that is placed on the proximal face (901). The rear image lens (52) is connected to an image processor and the rear illumination bulb (53) is connected to a ~~light source~~ power source by electrical cables (54, 55). In the preferred embodiment, the rear view module (51) is placed towards the periphery of the distal end (14) of the endoscope but it may be placed at anywhere on the distal end (14). The proximal face (901) of the rear view module is attached to the distal end (14) of the endoscope by a biplanar rolling joint (904) as shown in FIG.24B. It allows rolling motion of the rear view module in both vertical and horizontal planes from the distal end (14). Alternatively, the rear view module may be attached using any other suitable mechanical articulation. As shown in FIG.24B, a biplanar

rolling joint (904) consists of two grooves (907,908) placed orthogonally to each other. A small wheel (906) is placed within the groove. The outer part of this wheel is movable and the inner part is fixed. The rear view module (51) is attached to the fixed inner part. The rear view module is moved by rotating the wheel (906) along the grooves (907, 908). --

Please amend Paragraph [0096] as follows:

--[0096] FIG. 26 shows side view of a tenth preferred embodiment of the present invention. The rear view module (51) is a solid discoid structure that is mounted on the distal end of the endoscope (14). It has a proximal face (101) and a distal face (102). The rear view module (51) is attached to the distal end of the endoscope (14) by a hinge joint (103) or any other suitable mechanical articulation. The rear view module (51) has a rear image lens (52) and a rear illumination bulb (53) that is mounted on its distal face (102) of the module. The rear image lens (52) is connected to an image processor and the rear illumination bulb (53) is connected to a ~~light source~~ power source by electrical cables (54, 55). In resting position, the rear image lens (52) and the rear illumination bulb face forward and augment the main image lens (20) and the main illumination bulb (21) to widen the forward field of view. In the preferred embodiment, the rear view module (51) is placed at the periphery of the distal end of the endoscope (14) but it can be placed anywhere. The rear view module (51) is connected to a rear view module actuator by cables. Tension on these cables flips the rear view module (51) clockwise and anticlockwise vertically from the distal end of the endoscope (14). Alternatively, the rear view module can be flipped in a horizontal plane. --

Please amend Paragraph [0101] as follows:

--[0101] FIG.28 shows side view of an eleventh preferred embodiment of the present invention. The rear view module (51) is a solid discoid structure that is placed in front of the distal end (14) of the endoscope. The periphery of the rear view module (51) is attached to the distal end (14) of the endoscope by a hinge joint (285) or any other suitable mechanical

articulation. It has a proximal face (281) and a distal face (282). The rear image lens (52) and the rear illumination bulb (53) are placed on the distal face (282) of the rear view module. The rear image lens (52) is connected to an image processor and the rear illumination bulb (53) is connected to a ~~light source~~ power source by electric cables (54, 55). In resting position, the rear view module (51) covers the distal end of the endoscope (14) and faces forward. In this position, the rear image lens (52) gives a forward view and the rear illumination bulb (53) illuminates the area in front of the endoscope. In the preferred embodiment, the diameter of the rear view module (51) is the same as that of the distal end of the endoscope (14). The air/water channel (24) and the instrument channel (25) of the endoscope extend into the rear view module (283,284). The proximal and distal face of the rear view module (281, 282) is connected to a rear view module actuator by cables. Tension on these cables flips the rear view module (51) clockwise and anti clockwise vertically from the distal end of the endoscope (14) as shown in FIG. 29. Alternatively, the rear view module can be flipped horizontally. --

Please amend Paragraph [0106] as follows:

--[0106] FIG.30 shows side view of a twelfth preferred embodiment of the present invention. The rear view module (51) is a solid discoid structure that is placed in front of the distal end of the endoscope (14). It has a proximal face (301) and a distal face (302). The rear view module comprises of a rear image lens (52) connected to an image processor and a rear illumination bulb (53) connected to a ~~light source~~ power source by electric cables (54, 55). The rear image lens (52) and the rear illumination bulb (53) are placed on the proximal face (301) of the rear view module (51). In addition, the rear view module (51) has an additional image lens (303) and an additional illumination bulb (304) that is placed on its distal face (302). In the preferred embodiment, the diameter of the rear view module (51) is the same as that of the distal end of the endoscope (14). The main air/water channel (24) and the main instrument channel (25) of the endoscope extend into the rear view module (305, 306). The rear view module (51) is attached to the distal end of the endoscope (14) by a biplanar rolling joint as shown in FIG. 24B. This allows

rolling motion of the rear view module (51) both vertically and horizontally to the distal end of the endoscope (14). It may also be attached by any other suitable mechanical articulation. In resting position, the rear view module (51) covers the main image lens (20) and the main illumination bulb (21) of the endoscope. In this position, the additional image lens (303) and the additional illumination bulb (304) faces forward and gives a forward view and illuminates the area in front of the endoscope. --